

less mistook, under his microscope, the hairs of the moth. The article closes with the following:

Fertilization of plants exclusively by insects is, to my knowledge, not yet positively proven; but intentional fertilization, if one should take this for such, would belong to the realm of fable. This moth, in my opinion, is no *Pronuba*, but a corruptrix.

Mr. Boll should increase his knowledge by perusing what has been written on the fertilization of flowers by insects. He should also learn something more than he has done in this instance of a subject he intends to treat, and especially of observations which he undertakes to criticize. Investigations, however instigated, should be carried on, not under the warping influence of individual motive, but solely for the love of truth and knowledge.

On the Differences between ANISOPTERYX POMETARIA, Harr. and ANISOPTERYX ÆSCULARIA, W.-V., with Remarks on the Genus PALEACRITA.

By CHARLES V. RILEY.

[Read Nov. 5, 1877.]

Through profound study alone can we arrive at the true relationships of animals, especially in the inferior classes. Among insects, dozens of species in some families are absolutely undistinguishable in the imago state, though differing widely in the adolescent stages and in habit; while others, again, vary to such a degree that the same species has been described under more than a dozen names, and not unfrequently been made the basis of different genera. The Canker-worms furnish good occasion for these remarks. In the previous communication to the Academy on these insects, I stated (p. 278) that *Anisopteryx pometaria* differed from the other species of the genus, so far as was then known, in having an additional pair of prolegs in the larva state, but added: "For the present I deem it best to refer it to *Anisopteryx*, as more careful study will probably show that in the characters of egg, larva, and chrysalis, the European species of the genus agree with it, and that some of the structural features of the adolescent states have been overlooked in Europe, as they so

long were in this country." Through the kindness of Mr. Wm. Buckler of Emsworth, and of Mr. J. Hellens of Exeter, Eng., who have furnished me specimens, I am able to state that this surmise has been fully justified. A more careful study of the European *A. æscularia*, than had hitherto been made, shows it to agree with *pometaria* in structure and habit. The eggs have the same general form and are laid in the same regular manner; the larva has the third pair of prolegs (overlooked by former describers) on the 8th joint; the chrysalis is formed in a similar silken cocoon, and in both ♂ and ♀ is undistinguishable from *pometaria* except in the rather more distinct punctations on the abdomen.* While the two insects agree so well generically, *æscularia* is at once specifically distinguished by the eggs being somewhat broader, more rounded, less compactly pressed together, of a reddish-brown color, and particularly in being partly covered with hairs. The larva, while found on Elm, as is *pometaria*, feeds also on Oak, Lime and other trees, and has different colorational characters,† and the female is at once distinguished by a conspicuous anal tuft of hairs, which supplies those with which her eggs are covered. Yet the males of the two species bear such close resemblance that the best entomologists would be somewhat puzzled to separate a dozen of the least typical of each, if mixed together. The European species is, on an average, rather larger, lighter colored, and has the pale transverse band of secondaries more bent, especially on the underside.

In his "Monograph of the Geometrid Moths," published last year under the auspices of Dr. Hayden's Geological Survey of the Territories, Dr. A. S. Packard, Jr., gets badly confused on our two American Canker-worms. Although the misleading nature of Dr. Harris's language regarding the two species had been pointed out by Mr. Mann and myself (*ante*, p. 273), Dr. Packard nevertheless falls into the old error of concluding that Harris's *pometaria* is Peck's *vernata*. He does not stop here, however, but heightens the confusion that had once existed but had at last been dispelled, by re-christening *pometaria* with the new name of *autum-*

* I have described the chrysalis of *pometaria* as not pitted, but there is a very faint, more or less obsolete, punctation observable on more careful examination.

† Mr. Hellens has published a full description of it in *Ent. Monthly Mag.*, London, Oct. 1877, p. 114.

nata, and by calling the other species *vernata* Harris instead of *vernata* Peck. The inconvenience of this course, for which there is neither excuse nor justification, is seen in many parts of the work and particularly in the Introduction, where (p. 8) the names *pometaria* (not *autumnata*) and *vernata* are used in such manner that, after what is subsequently said on p. 402, the reader can only guess at the species intended.

But there is far graver error in what is published in the *Monograph* about these Canker-worms, and I call attention to it because it forms a marked exception to the high character and general excellence of the work. The structural characters which, as I have shown, separate *Anisopteryx* and *Paleacrita* are partly brought together in a generic diagnosis of *Anisopteryx*, which differs essentially from all other diagnoses of it, and which ends with the following remarks :

While Mr. Mann has shown, with much ability, from a consideration of the imaginal characters, that we have two well-marked and perfectly distinct species, Professor Riley has carried the matter further, and judges, from a comparison of the egg, larval and pupal states, as well as the imaginal, that not only are the two species distinct, but that there are really two genera, and for *vernata* he proposes the name *Paleacrita*. While his work shows great care and thoroughness, I am unable to agree with Mr. Riley's opinion that the differences he points out are of generic importance. The imaginal characters are certainly not so; for in other genera we have as great differences between the different species. The European *ascularia* would have to form the type of a third genus, if Mr. Riley's views are correct. We have seen that, as regards the larval characters, *vernata* in one case has an extra pair of legs, and the two species are sometimes easily confounded in the larval state. The eggs of the two species are very distinct; but the form and structure of the eggs in the *Phalœnids* have not been examined enough yet for us to form a decided opinion as to what are generic and specific characters among them.

The facts that have just been stated of *ascularia* show clearly enough that that species will not have to form a new genus; and as to the single case of the larva of *vernata* Peck having an extra pair of legs, on which case Dr. Packard leans for several generalizations, a critical examination of the specimen enables me to pronounce it not *vernata* as unhesitatingly as he pronounced it to be that species. It differs from *vernata* in the indistinctly spotted head, and especially in the dark top; in having but six superior pale lines; in having the medio-dorsum dark and without black

ornament; in the sub-obsolateness of the piliferous spots, and the nonconspicuity of those on joint 11; in the subdorsal region being pale and the stigmatal region dark. All these characters, together with the third pair of prolegs, belong to *pometaria* as distinguished from *vernata*. From *pometaria* the specimen differs in the narrowness of the pale lines, and of the medio-dorsal dark line; and while it may be an aberrant specimen of this last, it cannot possibly be *vernata*. The probability is that it belongs to another species entirely, as there are several other Geometrid larvæ that feed on Elm and Apple.

I speak with confidence because I have reared both the Canker-worms from the egg and have a vivid knowledge of their larval characteristics, some of the most important of which are not stated in Dr. Packard's description of *vernata*.

Though the word *either* occurs with awkward frequency in the diagnosis referred to, it should nevertheless occur still more often, until all the opposite and heterogeneous characters in the left-hand and right-hand comparative columns, as published by me (pp. 274-7), are brought together.

The mixed genus thus obtained is cited by Dr. Packard, in the Introduction of the work, as an instance of the small classificatory value of the number of legs in larvæ; which is about as convincing as it would be to a botanist, if some one were to throw *Caltha* and *Anemopsis* together because of their superficial resemblance, and then cite the mixed genus as evidence of the classificatory worthlessness of the important characters which cause those genera to be placed in different families.

There is no recognized standard by which authors gauge generic characters, and the greatest want of uniformity in custom unfortunately prevails among genus makers. Structure is of altogether more consequence than form, color, or dermal ornamentation; but the generic value of any character will depend on its invariability and rarity within the Family or Order. Wing-venation, on which systematists most rely in classifying moths, may be, and often is, of less value, on account of its variability, than special body covering. The abdominal spines and the general hairiness of *Paleacrita* are such very rare characteristics in the Family and even in the Order to which it belongs, that they acquire an importance which they otherwise would not possess.

As to the larval characters, the Geometrids have been separated into two great divisions on the pedal differences that distinguish *Paleacrita* and *Anisopteryx*, and while the divisions thus proposed, whether by Dennis and Schiffërmüller, by Samouelle or by Duponchel, may be more or less artificial, Dr. Packard will, I think, have few followers in denying generic value to the characters on which they are based.

The fact that Dr. Packard differs from me in this matter is in itself of no scientific importance; but I cannot pass unnoticed the error which seems to have contributed to his decision, and on which he builds a generalization that is not warranted. The fact that in certain restricted localities in New England the two insects sometimes occur on the same tree, has had a tendency to lessen the importance of their differences in the minds of some entomologists. At first reluctant to admit that there were two species, they still imagine the differences may prove to be dimorphic. They forget that *pometaria* is confined to New England,* and that *vernata* is wide-spread through the west and south, where no specimens of the other have yet been reported.

A new Oak-gall on Acorn Cups.

By CHARLES V. RILEY.

The gall which Dr. Engelmann refers to in the note to p. 392 is an undescribed species, the only hitherto known gall on the cups of acorns being the *Quercus-prunus* Walsh (*Proc. Ent. Soc. Phil.* iii. p. 639, and *Am. Ent.* i. p. 104), a quite large ($\frac{1}{2}$ to $\frac{3}{4}$ inch diameter) spherical, plum-like, fleshy growth, maturing in autumn on both *Quercus tinctoria* and *Q. rubra*. It grows out of the cupule, and, when fresh, is yellow with rosy spots. The new gall is more or less completely imbedded in the cup, and, on account of its resemblance to a diminutive acorn, I name it *glandulus*. I first received it from Dr. E. Michener of Toughkenamon, Pa., who wrote concerning it, Oct. 10, 1870:

“I found them this morning on the cups of *Q. bicolor* Wild. I think, although it was a shade tree in a field where cattle pastured, and the acorns

* In 7th *Mo. Ent. Rep.* I have quoted it (p. 86, note) from Dallas, Texas, on the authority of Dr. Packard; but I have since learned from Mr. Boll that it does not occur there, the specimens which he sent to Dr. Packard being *vernata*.

were badly trodden, that full two-thirds of the cups observed were affected. Those which I have opened still contain the larva."

I have seen it on *Q. prinoides* and *Q. bicolor*.* The parent *Cynips* lays the egg very early in summer, as the gall is often formed on the aborted or blighted acorns, in which case, however, it seldom attains perfection. The ripe and well developed gall falls out of its cavity on to the ground, where the larva remains within it till the following spring. Those galls which remain within the cavity are generally imperfect. The fly producing this gall has not yet been reared or described.

Cynips Gall *Quercus-glandulus*:—An elongate, pip-like body, averaging, when well developed, 5 mm. long, and not quite half as wide; sides sometimes parallel, but more often slightly bulging, more or less deeply corrugate longitudinally, and whitish-green; base truncate and covered with whitish down; crown flattened or slightly concave, with a central, conical nipple; color yellowish, often with a roseate tint. Larva lying in a cell near the crown. Formed in a cavity, and causing more or less bulging and swelling of the cupule. The mouth of the cavity either strongly fimbriated, or simple, according to the nature of the cup scales, and thus either hiding the gall or exposing a large part of it.

This gall is allied in structure to that described by Mr. Bassett as *Quercus frondosa* (*Proc. Ent. Soc. Phil.* iii. p. 688), which is a deformation of an oak bud. The axillary bud is made by the stinging of the *Cynips* to prematurely develop a number of lanceolate or ovate leaves which surround one or more cells, which loosen from their leafy matrix when ripe and drop to the ground. An analogous deformation of an oak bud, caused by *Cynips fecundatrix* Hartig, is very common in Europe, and is known in England as the Artichoke-gall. The cell of this gall has been described as an aborted acorn by Mr. Albert Müller,† who has made a special study of galls. It is not surprising, therefore, that our *glandulus* gall should very generally be looked upon as a diminutive or secondary acorn. Yet such views are quite erroneous. The cells of very many other Cynipidous galls resemble acorns in form, and the resemblances to different fruits among these singular plant-and-insect productions is often so striking as to easily mislead.

* Dr. Engelmann has noticed it on *Q. Prinus*, *Q. Michauxii*, and *Q. Mühlbergii*. It thus occurs on every form of the *Prinus* Group, to which it is apparently confined.

† *Four. of Linn. Soc. (London) Zool.*, vol. xi. p. 3.